Please provide the following information, and submit to the NOAA DM Plan Repository.

Reference to Master DM Plan (if applicable)

As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

1. General Description of Data to be Managed

1.1. Name of the Data, data collection Project, or data-producing Program:

AFSC/RACE/SAP/Long: Data from: Habitat, predation, growth, and coexistence: Could interactions between juvenile red and blue king crabs limit blue king crab productivity?

1.2. Summary description of the data:

This data set is from a series of laboratory experiments examining the interactions between red and blue king crabs and habitat. We examined how density and predator presence affect habitat choice by red and blue king crabs. Further experiments determined how temperature and habitat affect predation by year-1 red king crab on year-0 blue king crab. Finally, long-term interaction experiments examined how habitat and density affected growth, survival, and intra-guild interactions between red and blue king crab.

1.3. Is this a one-time data collection, or an ongoing series of measurements?

One-time data collection

1.4. Actual or planned temporal coverage of the data:

2010 to 2012

1.5. Actual or planned geographic coverage of the data:

W: -152.396421, E: -152.396421, N: 57.78105, S: 57.78105
Kodiak Laboratory, Kodiak, AK

1.6. Type(s) of data:

(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
Table (digital)

1.7. Data collection method(s):

(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)
Instrument: N/A
Platform: N/A
Physical Collection / Fishing Gear: N/A

1.8. If data are from a NOAA Observing System of Record, indicate name of system:

1.8.1. If data are from another observing system, please specify:

2. Point of Contact for this Data Management Plan (author or maintainer)

2.1. Name:
Metadata Coordinators MC

2.2. Title:
Metadata Contact

2.3. Affiliation or facility:

2.4. E-mail address:
AFSC.metadata@noaa.gov

2.5. Phone number:

3. Responsible Party for Data Management
Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.

3.1. Name:
Chris Long

3.2. Title:
Data Steward

4. Resources
Programs must identify resources within their own budget for managing the data they produce.

4.1. Have resources for management of these data been identified?
No

4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):
Unknown

5. Data Lineage and Quality
NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.

5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

(describe or provide URL of description):

Process Steps:

- Red and blue king crabs for these experiments were all laboratory- or hatchery-reared. Red king crab broodstock were captured using baited commercial pots in Bristol Bay in the winters of 2008, 2009, and 2010, and transported to the Kodiak Laboratory. In 2008 and 2009, crabs were flown to the Alutiiq Pride Shellfish Hatchery, Seward, Alaska, in coolers with wet burlap and ice blocks. Blue king crab broodstock were also captured near St. Matthew Island in the winter of 2010 and flown to the Kodiak Laboratory in coolers. Broodstock crabs were held in flowing ambient seawater and fed a diet of frozen squid and herring. Larvae were collected after hatching and reared to the C1 stage. Larvae were fed a diet of DC DHA Selco (INVE Aquaculture, UT, USA) enriched Artemia nauplii. In 2009 and 2010, juvenile crabs were flown to Kodiak in insulated bottles. Juveniles were held in tanks with flowing, raw seawater at ambient temperature (typically varies between about 3 and 9 °C throughout the year, personal observation) and salinity. Whenever juveniles were held together they were given structure in the form of gill netting or artificial macro-algae in order to reduce cannibalism. Year-0 juvenile crabs were fed frozen Artemia (Brine Shrimp Direct, Ogden, Utah, USA), frozen bloodworms (Brine Shrimp Direct, Ogden, Utah, USA), frozen Cyclop-eeze (Argent Laboratories, Redmond, Washington, USA), Cyclop-eeze flakes, and Gelly Belly mixed with Cyclop-eeze powder and walleye pollock (Theragra chalcogramma) bone powder (U. S. Department of Agriculture, Agricultural Research Service, Kodiak, Alaska, USA) twice per week to excess. Older juvenile crabs were gradually shifted to a diet of chopped frozen fish and squid, and were held in individual containers to eliminate cannibalism.
- We examined effects of density and predator presence on habitat choice by year-0 red and blue king crabs. Identical experimental procedures were followed for red king crabs in December 2010 and blue king crabs in December 2011. Trials were performed in plastic containers 31 x 20 x 24 cm (L x W x H) held inside a larger tank 170 x 90 x 30 cm (L x W x H) with flow-through ambient seawater. Plastic containers had holes covered with mesh screen on either side to allow for water exchange between the containers and the large tank. Two densities of year-0 crabs, 5 and 20 per container, were used. Three habitat types were used: Sand, Cobble (a preferred habitat type for red king crab in the wild), and Shell Hash (a preferred habitat type for blue king crab in the wild). In each trial, crabs were given a choice of 2 habitat types for a total of three treatments (sand:cobble, sand:shell, cobble: shell) and habitats were randomly assigned to different sides of the containers. In the red king crab experiments, year-0 red king crab had an average CW (+/-SD) of 6. 6 ± 1.4 mm, predators had an average CL of 31.9 +/- 3.5 mm, and the average temperature (+/-SD) was 6.1 +/- 0.4 degrees C. In the blue king crab experiments, year-0 blue king crab in the habitat choice experiment had an average CW (+/- 1 SD) of 3.4 +/- 0.6 mm, predators had an average CL (+/- 1 SD) of 21.2 +/- 1.2 mm, and the average temperature (+/- 1 SD) was 4.7 +/- 0.1 degrees C. For each trial, one habitat type was placed on one side of the experimental container and the other habitat

type on the other. Sand and shells for the experiment were gathered from a local beach. Sand was passed through a 1 mm mesh screen and the shells were washed prior to use. Shells were whole bivalve valves. Cobble was comprised of local shale washed prior to use. The Sand treatment consisted of a 2 cm layer of sand on the bottom of the container. The Shell Hash treatment consisted of 800 ml of bivalve valves layered on top of 2 cm of sand and the Cobble treatment consisted of 6 pieces of cobble layered on top of 2 cm of sand. Predators were year-1 red king crabs with at least one chela and no more than 2 missing walking legs. Predators were placed inside containers for the predator presence treatments to ensure physical cues. Chelae of predator crabs were wrapped in thin copper wire to prevent consumption of year-0 crabs. This method was highly effective; only one crab during both experiments managed to escape from the wires. As there was no evidence of predation, we included this trial in the analysis. The experiment fully crossed density, predator presence, and habitat, with five replicates of each combination for a total of 60 trials for each species. Six trials were performed each day and treatments were performed in a random order. Experimental protocol was as follows. Habitats were established in containers in the morning. Carapace width (CW) including spines was measured for five haphazardly selected year-0 crabs for each trial. Predator chelae were wired shut and their carapace length (CL) was measured. At 1000 h, year-0 crabs were introduced into the middle of the containers at the intersection between the two habitat types. Predators were introduced immediately afterwards. The trials were 4 hours in duration, as red king crab do not change their habitat choice in short-term experiments. At 1400 h, all predators were removed, a plastic divider was used to separate the two halves of each container, and the number of year-0 crabs in each habitat was counted. Year-0 crabs were sometimes found on the mesh covering the holes in the sides of the container and were excluded from analysis.

- We determined the effects of habitat and temperature on predation by year-1 red king crabs on year-0 blue king crabs. Trials were performed in the same containers, tank, and habitat types (Sand, Shell Hash, Cobble) described above. Habitats were established in the same manner as above except Shell Hash consisted of 1.6 L of bivalve valves and Cobble consisted of 12 pieces of cobble. We used three temperatures: 1.5, 5, and 8 degrees C, representative of the range of temperatures experienced by both species in Bering Sea (Somerton, 1985) and the temperature was measured in each replicate. The experimental design was fully crossed and five replicates of each habitat/temperature combination were performed. Trials within each temperature treatment were run in random order. We used ambient flow-through water and adjusted the temperatures with submersible heaters placed inside the larger tank. A submersible pump was used to provide direct flow into each container. At 1500 h, habitats were established in each container. Ten year-0 blue king crabs (CW 2.1-6.5 mm) were then placed in each tub and allowed to acclimate overnight. Predators were intermolt year-1 red king crabs (CL 15-25 mm) with no more than 2 missing walking legs. Predators were starved for 24 hours prior to the trials to standardize hunger levels. At 0900 h the next morning,

predators were introduced and allowed to feed for 2 hours. At the end of the trial, predators were removed and the number of surviving prey counted.
- We examined the effects of habitat and year-0 red king crab density on the long-term survival and growth of year-0 red king crabs. The experiment was run for three months (13 weeks) from January 4, 2011, to April 5, 2011. We fully crossed habitat (Sand, Cobble, Shell Hash) with Low and High year-0 crab density (5 and 20 per container) and replicated each habitat/density combination 4 times for a total of 24 trials. Trials were performed in containers (as above) with the habitats consisting of 2 cm of sand for the Sand treatment, and 18 pieces of cobble or 1.6 L of bivalve shells layered on top of 2 cm of sand for the Cobble and Shell Hash treatments. The containers were placed into two larger tanks (as above) in random order. The tanks were stacked with water flow going from the top tank into the bottom. Flow-through ambient water was provided to the tanks and heated to 8 degrees C using submersible heaters. The temperature was gradually increased from ambient to 8 degrees C over the first week. Water flow to the containers was via flow through the holes in their sides. The arrangement of the tubs caused water-flow problems in two of the containers early in the experiment and led to a high mortality rate in those trials. Those trials were removed from the experiment, the data was not included in the analysis and the tubs were rearranged to ensure adequate water flow. At the beginning of the experiment, the CW of each crab was measured before placing the crabs in their trials at the appropriate densities. Crabs were fed three times per week on a diet of frozen bloodworms and Artemia, Gelly Belly (as above), and, later in the experiment as the crabs grew, chopped frozen squid. Food was provided to excess and the tanks were given a light cleaning 24 hours after feeding to remove the majority of the excess food. Each week, all of the crabs were removed from each trial and the containers were given a thorough cleaning. At the same time, the CW of all of the crabs was measured and the number of surviving crabs counted. After 13 weeks, the experiment was ended and all of the crabs were removed, measured, and counted. We examined the effect of habitat and intra-guild interactions on the survival and change in size of red and blue king crabs. In this experiment we used two fully crossed treatments: habitat (Cobble and Shell Hash) and species composition (red king crab only, blue king crab only, and both species together). The overall density the same in all treatments: 10 crabs per container. In trials with both species, 5 of each were stocked. We fully crossed Habitat and Species Composition and performed four replicates of each treatment. The experiment was run from February 7 to May 1, 2012. Experimental protocol was identical to the previous experiment except that the temperature was held at 5 degrees C. The experiment was run for 12 weeks, and recirculated flow was provided via submersible pumps to each container. During sampling, one crab was accidently killed and was not included in the analysis.

5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:

5.2. Quality control procedures employed (describe or provide URL of description):
All data was QA/Qc'd, checked for outliers and invalid values

6. Data Documentation
The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.

6.1. Does metadata comply with EDMC Data Documentation directive?
Yes

6.1.1. If metadata are non-existent or non-compliant, please explain:

6.2. Name of organization or facility providing metadata hosting:
NMFS Office of Science and Technology

6.2.1. If service is needed for metadata hosting, please indicate:

6.3. URL of metadata folder or data catalog, if known:
https://inport.nmfs.noaa.gov/inport/item/26521

6.4. Process for producing and maintaining metadata
(describe or provide URL of description):

Metadata produced and maintained in accordance with the NMFS Data Documentation Procedural Directive: https://inport.nmfs.noaa.gov/inport/downloads/data-documentation-procedural-directive.pdf

7. Data Access
NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.

7.1. Do these data comply with the Data Access directive?
No

7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?
No

7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:

There are no legal restrictions on access to the data. They reside in public domain and can be freely distributed.

7.2. Name of organization of facility providing data access:
Alaska Fisheries Science Center

7.2.1. If data hosting service is needed, please indicate:
yes

7.2.2. URL of data access service, if known:
https://www.ncei.noaa.gov

7.3. Data access methods or services offered:
unknown

7.4. Approximate delay between data collection and dissemination:
unknown

7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:
No delay

8. Data Preservation and Protection
The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.

8.1. Actual or planned long-term data archive location:
(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)
NCEI-MD

8.1.1. If World Data Center or Other, specify:

8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:

8.2. Data storage facility prior to being sent to an archive facility (if any):
Alaska Fisheries Science Center - Seattle, WA

8.3. Approximate delay between data collection and submission to an archive facility:
Unknown

8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?
Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection
IT Security and Contingency Plan for the system establishes procedures and applies to

the functions, operations, and resources necessary to recover and restore data as hosted in the Western Regional Support Center in Seattle, Washington, following a disruption.

9. Additional Line Office or Staff Office Questions

Line and Staff Offices may extend this template by inserting additional questions in this section.